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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/498,336	02/04/2000	Jeffrey A Shields	52352-372	8690

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EXAMINER

PEREZ RAMOS, VANESSA

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 06/17/2002

11

Please find below and/or attached an Office communication concerning this application or proceeding.

72-11

Office Action Summary

Application No.

09/498,336

Applicant(s)

SHIELDS ET AL.

Examiner

Vanessa Perez-Ramos

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-14 and 16-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-14 and 16-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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The following is a new, non-final Office Action.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation "removing the photoresist mask" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Specification

3. The status of 09/498335, 09/933430 and 08/933125 needs to be updated. Appropriate action is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 5-14 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over You et al. (U.S. 6,235,453) in view of Applicant's Admission of Prior Art.

In regard to claims 1-3, 5-8, 12-14, and 16-18, You discloses a method comprising: forming a first dielectric layer on a substrate (col. 2, line 62); forming a first patterned conductive layer (col. 2, lines 62-63 and col. 3, lines 32-33); depositing a second dielectric layer (col. 2, line 63), which can be HSQ (col. 3, lines 6-8); forming a photoresist mask (col. 2, line 64); forming a via, which reads on Applicant's "trough hole", in the second dielectric layer and exposing the upper surface of the first conductive one (col. 4, lines 12-18); removing the photoresist mask (col. 4, line 20) and cleaning with a plasma (col. 4, line 23) containing CF₄ and H₂O (col. 4, lines 41-42). Furthermore, You discloses that the second dielectric layer is a low-k dielectric, which is believed to read on Applicant's "dielectric constant no greater than about 3". Also, You discloses that, after the plasma cleaning with CF₄ and H₂O, "low dielectric constants are maintained" (col. 4, lines 50-65), which is believed to read on Applicant's "such that the dielectric constant of the as deposited gap fill layer and/or second dielectric layer does not increase more than about 15%".

Unlike the claimed invention, You does not disclose the formation of "gaps" in the first patterned conductive layer, which are subsequently filled with a "dielectric gap fill layer".

Applicant admits, as part of his Prior Art descriptions, that "Conventional semiconductor devices typically comprise....a conductive plug filling a via opening..." (page 2, lines 2-22) and, furthermore, that "A conductive plug filling a via opening is typically formed by depositing an inter-layer dielectric on a patterned conductive...forming an opening...and filling the opening..." (page 2, lines 23-35).

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It is the Examiner's position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify you by forming gaps in the first patterned conductive layer, which are subsequently filled with a "dielectric gap fill layer, as per the Admitted Prior Art, because this is a common, typical and well known step in the art of semiconductor manufacturing, and would have been obvious to one of ordinary skill at the time of the invention.

In regard to claims 9-11 and 19-20, it is the Examiner's position that the variation of result effective variables, such as flow rates, pressures and temperatures is obvious to one skilled in the art, with the purpose of establishing the optimum process conditions.

Response to Arguments

6. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

It is noted, however, that Applicant included an "Exhibit A" containing U.S. Patent 6,433,143. This reference has NOT been considered, as it has not been properly submitted in accordance with MPEP 609.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vanessa Perez-Ramos whose telephone number is 703-306-5510. The examiner can normally be reached on Mon-Thurs 7:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-5665.

Vanessa Perez-Ramos
Examiner
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VPR
June 12, 2002



ROBERT KUNEMUND
PRIMARY EXAMINER